Renewable and Alternative Energy Developments

A Key Component of Dominion Virginia Power's Regulated Utility Solutions

Presented to Metropolitan Washington Council of Governments
January 25, 2012

Virginia's Electric Regulatory Framework

- Under Virginia law, the generation, transmission, and distribution of electricity is regulated by the State Corporation Commission (SCC).
- Virginia's modified cost-of-service regulation, with broad SCC powers, requires:
  - Integrated Resources Planning by utilities.
    - Empirical process to find lowest reasonable cost options for meeting load growth.
  - Regular biennial reviews of utility rates, returns, and costs.
  - SCC approval for all generating and transmission facilities.
- In consideration of approval for generating facilities, the SCC must determine costs to be reasonable and prudent in order to approve the project for cost recovery – including a consideration of alternative generation solutions.
- Not one penny can be added to utility customer bills without SCC approval.

Integrated Resource Plan (IRP)

- The IRP provides a forecast of the Company's load obligations and a plan to meet those obligations by supply side and demand side resources over the ensuing 15 years to promote reasonable prices, reliable service, energy independence, and environmental responsibility. (VA Code § 56-597).
- The IRP represents a snapshot in time and changes annually based on market, legislative, and/or regulatory drivers.
- Updated annually, filed in alternating years with VA SCC and NCUC, September 1st.
- In Virginia, the SCC makes determination on reasonableness and whether plan is in the public interest.
- Approval of new generation components must be addressed in separate SCC proceedings.

Virginia RPS Goals

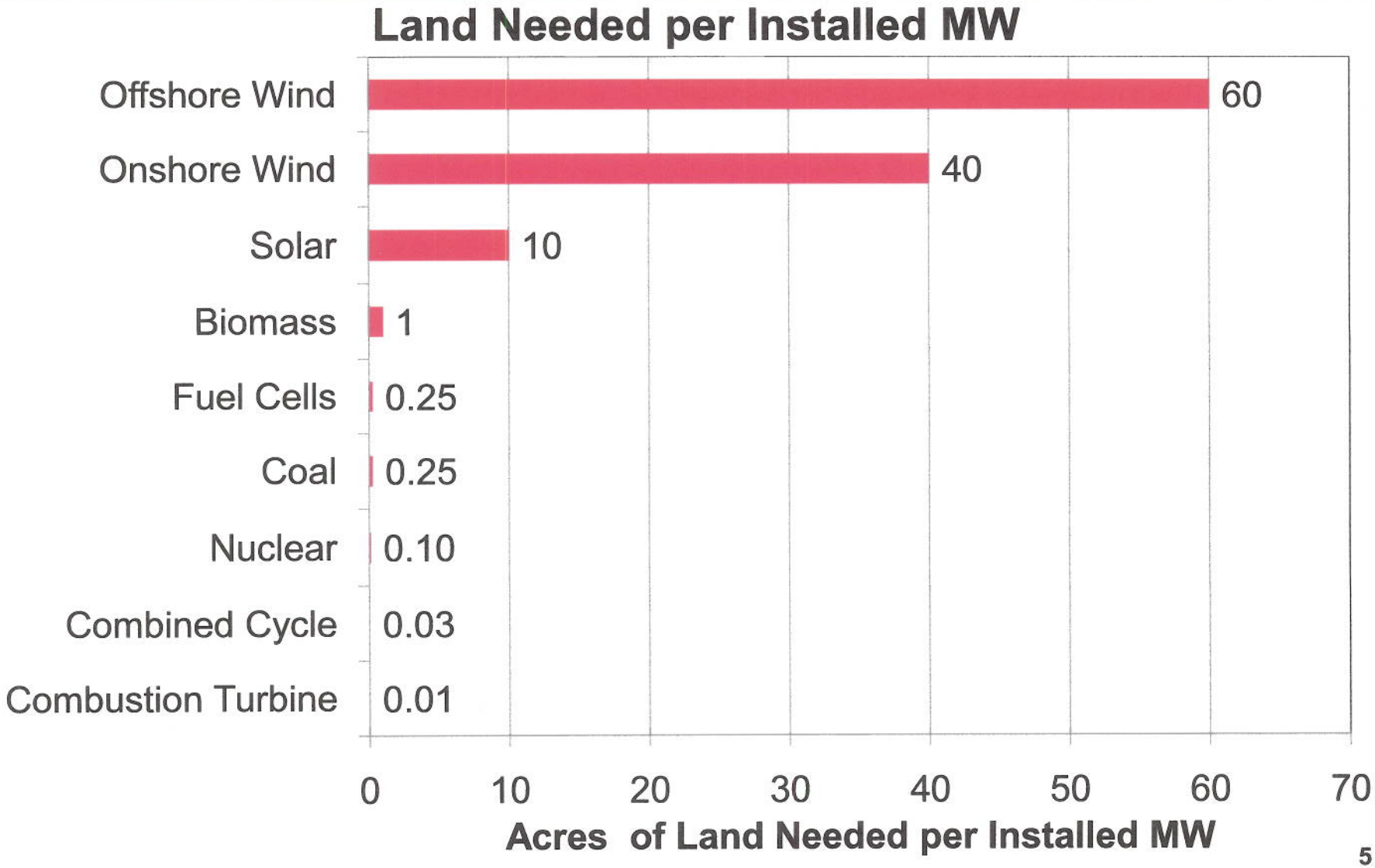
- In 2007, Virginia passed into law a voluntary Renewable Portfolio Standard (RPS):
  - 4% by 2010
  - 7% by 2016
  - 12% by 2022
  - 15% by 2025

- Sunlight, wind, falling water, sustainable biomass, energy from waste, wave motion, tides, and geothermal power

- Dominion's Virginia RPS plan was approved by the SCC in 2010. The approved plan involves use of use of existing assets, building new facilities where feasible, and the purchase of low-cost RECs

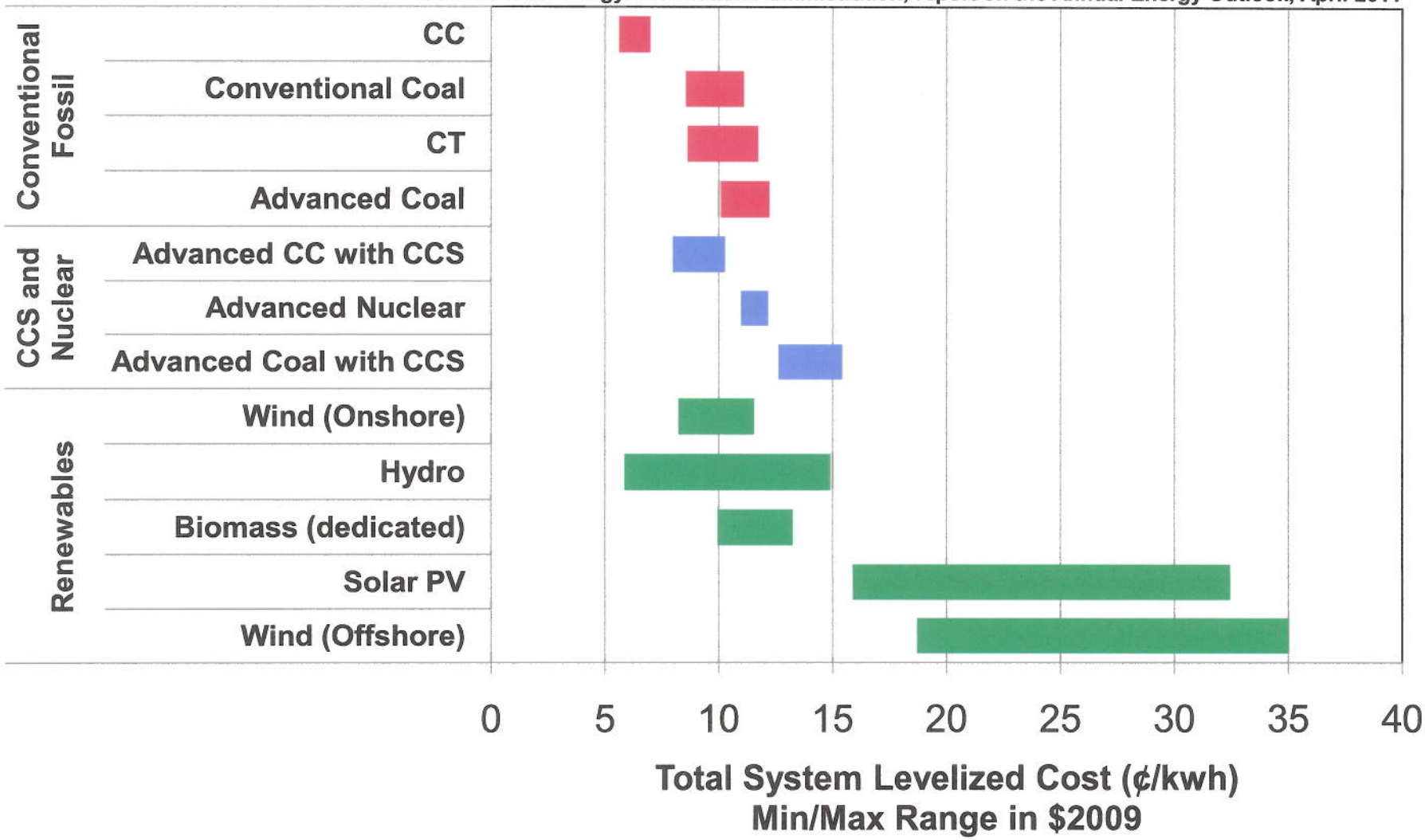
- Virginia's RPS is voluntary and involves a two-step approval process
  - Approval of the RPS Plan
  - Approval of expenses to achieve goal

Renewable Generation: Land Use Intensity



Levelized Cost of New Generation: 2016 Commercial Operation

Source: U.S. Energy Information Administration, report on the Annual Energy Outlook, April 2011



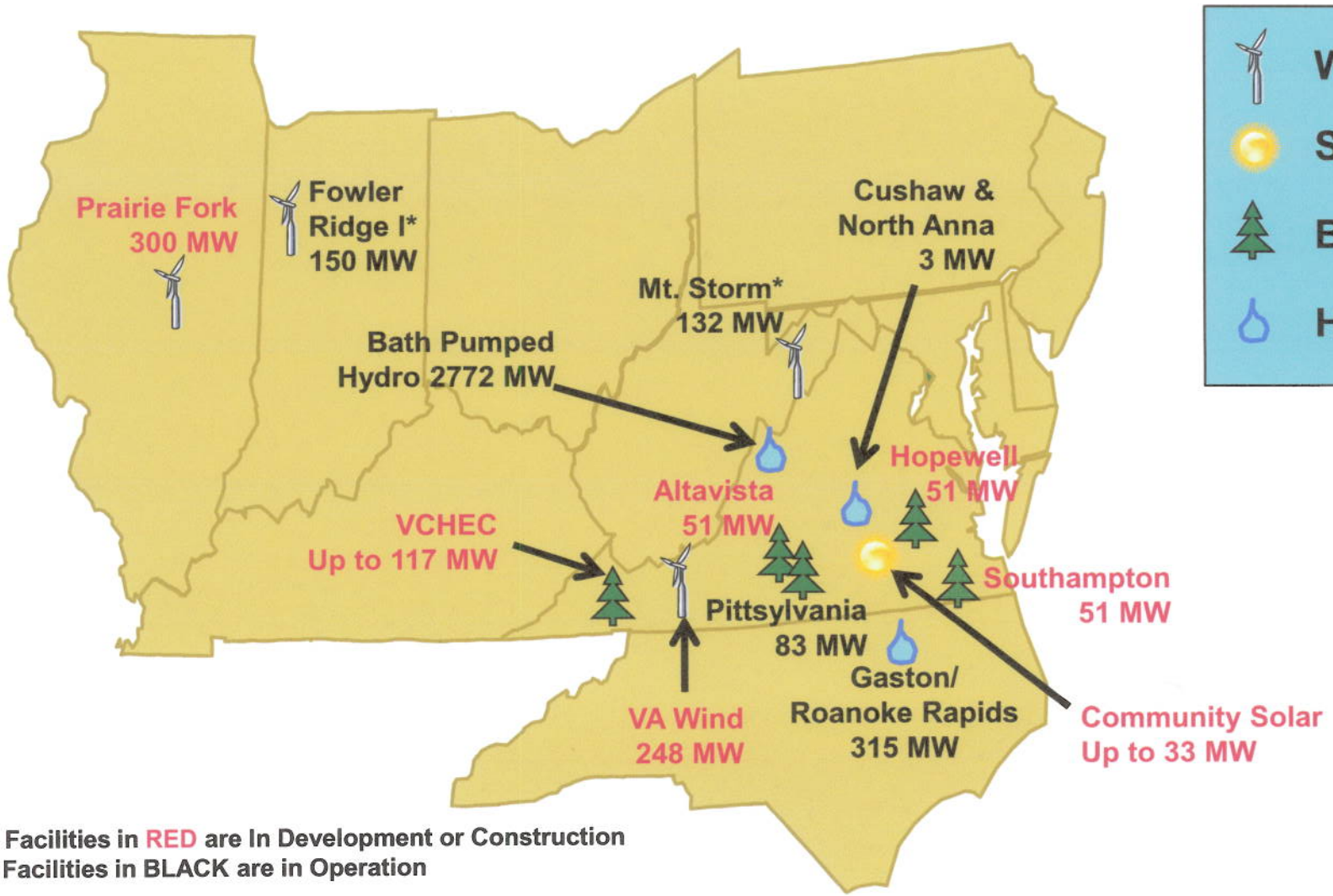
CC = Combined Cycle; CT = Combustion Turbine; CCS = Carbon Capture & Sequestration; **PV** = Photovoltaic

2011 DVP Integrated Resource Plan

Year	Plan A Base Plan		Plan D Renewable Plan	
	Traditional	Renewable/ DSM	Traditional	Renewable/ DSM
2012	VCHEC	App. DSM	VCHEC	App. DSM
2013		Pro./Fut. DSM/AV/HW/SH		Pro./Fut. DSM/SLR/AV/HW/SH
2014		Halifax		Halifax/SLR
2015	Warren		Warren	SLR
2016	CC		CC	WND
2017				WND
2018			CT	WND / Bio
2019	CC		CT	Bio / OFF
2020	CT		CT	OFF
2021	CT		CT	
2022	NA3		NA3	
2023	CT		CT	
2024	CT		CT	
2025	CT		CT	
2026	CT		CT	

Key: *AV: Altavista Biomass Conversion; App. DSM: Approved DSM Programs; Bio: Biomass; CC: Combined Cycle; CT: Combustion Turbine (2 units); Halifax: Halifax Solar; HW: Hopewell Biomass Conversion; NA3: North Anna 3; OFF: Offshore Wind; Pro./Fut.DSM: Proposed and Future DSM Programs; SH: Southhampton I Biomass Conversion; SLR: Solar; VCHEC: Virginia City Hybrid Energy Center; Warren: Warren County Combined Cycle; WND: Onshore Wind.*
Note: DSM capacity continues to increase throughout the Planning Period.

Dominion's Renewable Energy Facilities - Wind, Solar, Biomass and Hydro



Note: Facilities in RED are In Development or Construction
Facilities in BLACK are in Operation

* Megawatt capacity represents Dominion's 50% capacity only

Dominion's Renewable Projects In Development

- **Biomass**
  - Conversion of 3 small coal-fired units to wood
    - -Commercial Operation Date (COD) 2013
    - -Provide up to 153 MW base load generation
    - -Filed SCC application in June 2011
    - -Hearing January 2012
  - Virginia City Hybrid Energy Center (up to 20%)
    - -Sourcing wood fuel, projecting use 2 years after COD
  - Greenfield wood biomass sites (COD TBD)
    - -Siting efforts in development

- **Solar**
  - Community Solar Power Program
    - - 30 MW Company installations on leased roofspace (filed October 2011)
    - - Solar DG Purchase Tariff for 3 MW (to be filed by Q2 2012)

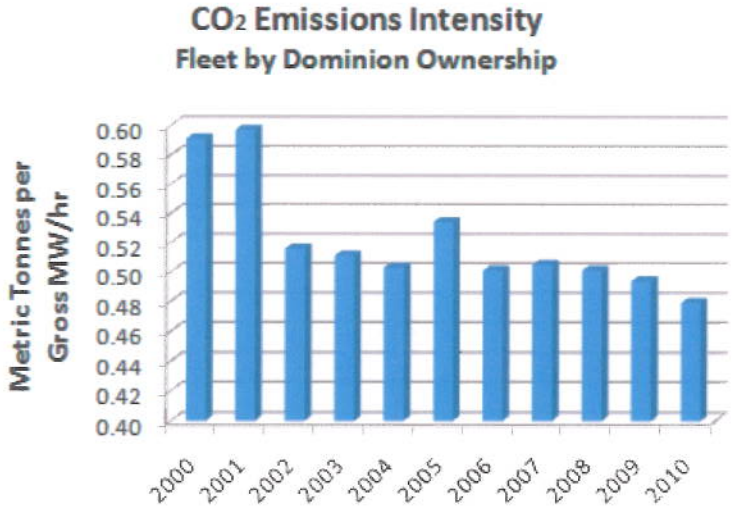
- **Wind**
  - Onshore (COD TBD)
    - -3 sites on Virginia Ridgeline
    - -Working with localities for support
  - Offshore (study and evaluation, COD TBD)
    - -Completed Transmission study, Member VA Offshore Wind Dev Authority
    - -Intend to participate in Call for Interest and Nominations (~Q1 2012)
    - -Awarded $500K grant for offshore wind cost evaluation

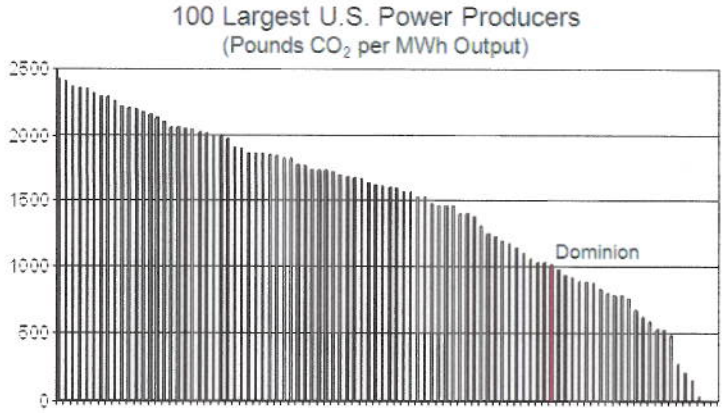
Renewable Energy and Energy Efficiency Options for Virginia Customers

- Energy Efficiency
- Community Solar Power Program (Pending Commission Approval)
- Dominion Green Power Program
- Net Energy Metering
- Schedule 19 – Avoided Cost Tariff

Carbon Dioxide Emission Reductions

- Comparing 2000 to 2009, generating fleet (based on ownership percentage) we reduced our average CO2 emissions rate per MWh of energy produced by ~16%, while the fleet has grown 44%.





Source: Natural Resources Defense Council, 2008 Study

http://www.dom.com/about/environment/report/co2-emissions.jsp

- We have an integrated strategy for reducing GHG emission intensity based on:
  - Maintaining a diverse fuel mix
    nuclear, coal, gas, hydro and renewable energy
  - Investing in renewable energy projects
  - Promoting energy conservation and efficiency

APPENDIX

Energy Efficiency: DSM and Peak Shaving Programs for Customers in Virginia

- Existing Approved Programs
  - Residential
    - Residential Lighting
    - Smart Cooling Rewards
    - Home Energy Improvement
  - Business
    - HVAC Rewards
    - Lighting Rewards

- Proposed Programs - Sept. 2011 (Hearing March 2012)
  - Residential
    - Residential Lighting Phase II
    - Residential Bundle - includes Home Energy Check Up, Residential Duct Testing & Sealing, Residential Heat Pump Tune-Up, Residential Heat Pump Upgrade
  - Business
    - Commercial Energy Audit
    - Commercial Duct Testing & Sealing
    - Commercial Refrigeration
    - Commercial Distributed Generation Program
  - VA SCC Docket No. PUE-2011-00093 http://www.scc.virginia.gov/

Solar Distributed Generation

Community Solar Power Program

- Company-owned solar distributed generation (DG) installations on leased roof space
  - Petition filed with VA SCC in October 2011
  - Total of 30 MW – individual systems will range between 500 kW and 2 MW
  - Purpose is to assess benefits to the distribution system of targeted solar DG installations
  - If approved, installations to be completed 2013 – 2015
  - At least four installation must be in community settings

- Special tariffs to facilitate customer-owned solar DG as an alternative to net metering
  - Petition to be filed by 2Q 2012
  - Tariff will allow for purchase a total of up to 3 MW
  - Eligible participants will be residential and small commercial customers
  - Company will purchase energy and renewable attributes at a price per kWh

- 2011 enabling legislation
  - HB1686 passed during the 2011 General Assembly promoting solar energy through distributed generation

Dominion Green Power Program

- Voluntary program available to Dominion Virginia Power customers to purchase renewable energy certificates (RECs) through their utility bill.
- Customer options available:
  - Residential (Rider G)
  - Commercial/Industrial (Rider G)
  - Large Federal (Rider G-MS)
  - Commonwealth of Virginia (Rider G-COV)
  - County/Municipal (Rider G-CM)

GreenPower℠

http://www.dom.com/dominion-virginia-power/customer-service/energy-conservation/green-power.jsp

- RECs are purchased from a mix of sources (wind, biomass, solar).
- Two participation options:
  - *100% Option:* Customer purchases RECs equal to 100% of their monthly electricity use.
  - *Block Option:* Customer purchases RECs in any $2 fixed increment.
- Dominion does not make a profit from this program.

Net Energy Metering

- On site renewable generation connected to electric grid through the customer meter
- System Capacity Limit
  - Residential Customers – 20 KW (standby charge for systems >10 KW)
  - Commercial Customers – 500 KW

- How it works
  - Energy primarily used on-site to offset customer's usage
  - Any excess generation is credited at the full retail rate and rolled forward to the next billing month
  - At the end of the billing year, any remaining excess generation can be sold back to DVP at the PJM LMP provided that the customer entered into a power purchase agreement with DVP
  - Customer-generators own all renewable energy credits (RECs), and have a one-time option at the time a power purchase agreement is entered to sell the RECs to the utility based on DVP's Rider G price

Schedule 19

- Dominion Virginia Power will purchase power produced by qualifying facilities (QFs) up to 20 MW in capacity at Dominion's avoided cost in accordance with the Public Utility regulatory Policies Act (PURPA)

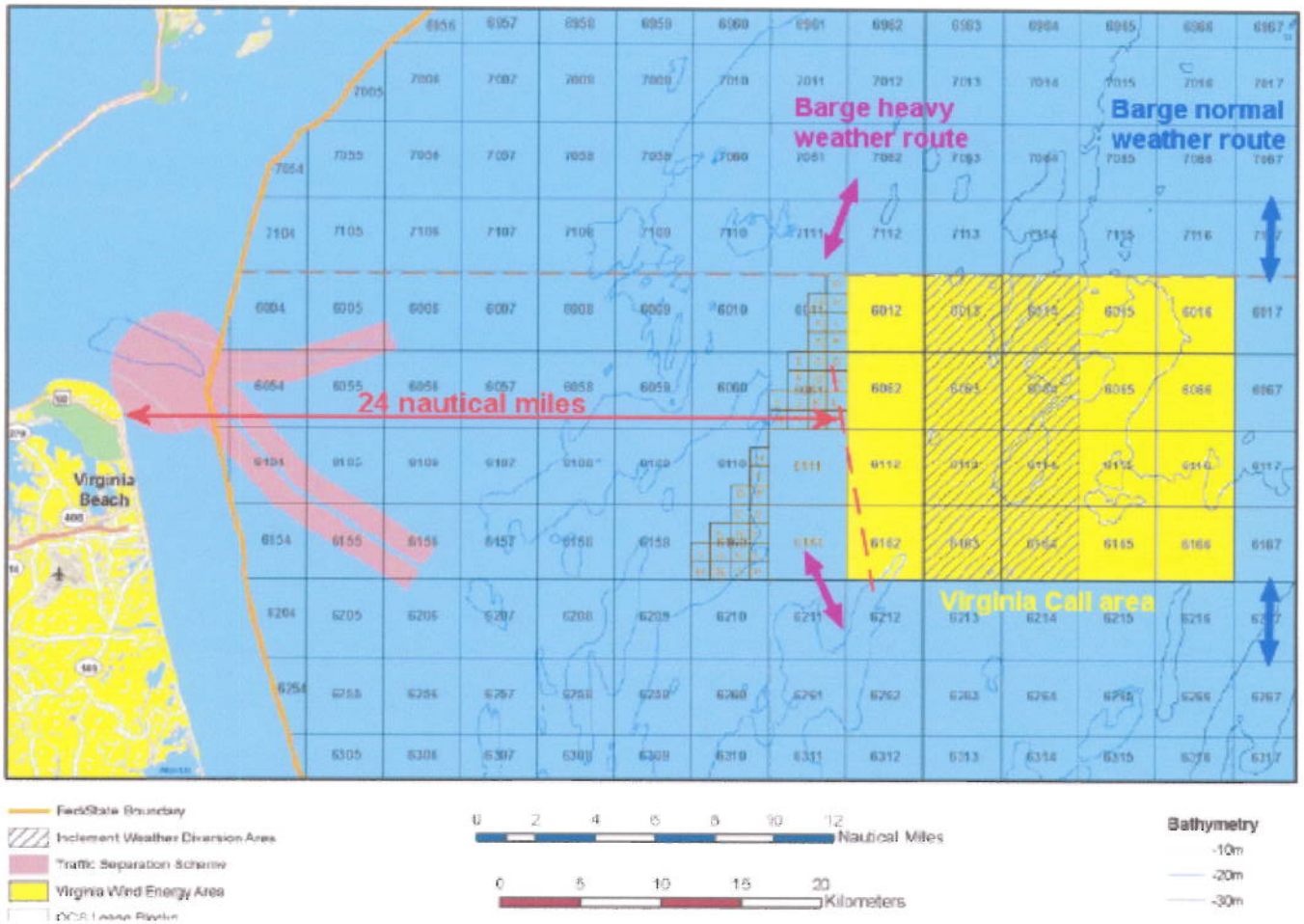
- SCC-approved Schedule 19 Tariff details how this rate is calculated:

http://www.dom.com/dominion-virginia-power/customer-service/rates-and-tariffs/pdf/sched19.pdf

- QFs are divided into two size groups:
  - Energy only at a fixed price without regard to time of day the energy is delivered
  - Energy and capacity where the energy price varies depending on the time of day
  - QFs over 10kW must choose energy and capacity

Proposed Virginia Offshore Wind Call for Information and Nominations Area

- Total blocks available: 20 blocks approximately
- Total potential area: 165 sq nautical miles
- Average distance to shore: 20 miles
- Average depth of water: > 30m (100 ft)



Call for Information and Nominations

Dominion

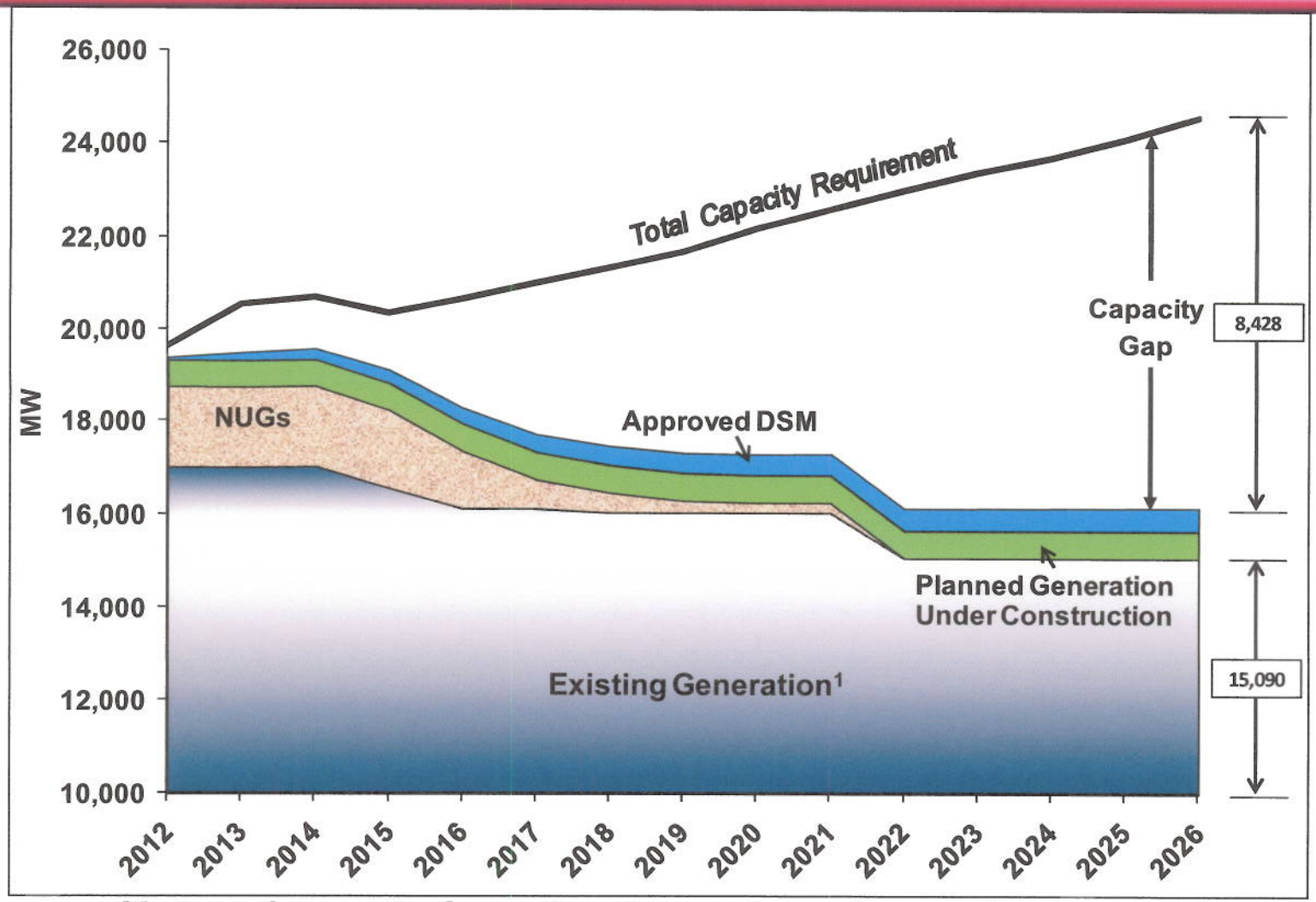
- Comment Period: 45 days

- Information required to be submitted for call
  - Area of interest for a possible lease;
  - Description of objectives and the facilities used to achieve those objectives
  - Schedule of proposed activities, including those leading to commercial operations
  - Data and information concerning renewable energy and environmental conditions
    - Energy data
    - Natural and cultural resource data
  - Documentation demonstrating qualifications to hold a lease;
  - Overview of offshore transmission systems;
  - Potential for BOEMRE to request additional information.

Dominion's Proven Renewables Biomass Example

- Pittsylvania Power Station (biomass)
- Hurt, Virginia
- Capacity: 83 MW
- One of the largest biomass power facilities on East Coast
- High reliability
- Base-load resource
- Wood: 650K tons/yr

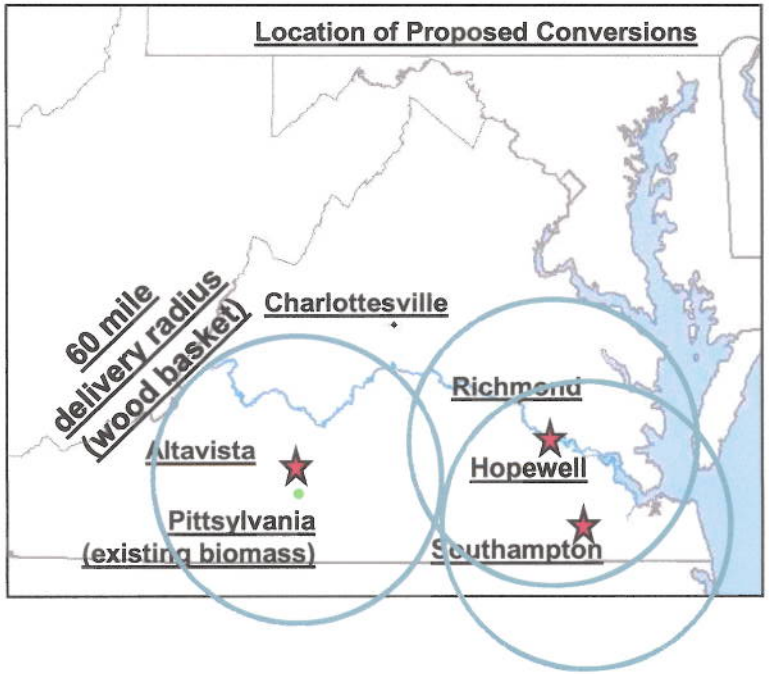
2011 Integrated Resource Plan
Current Capacity Position (2012-2026)



Note: Accounts for unit retirements and capacity changes to existing units in the Plan, and reflects summer capacity ratings.

BIOMASS CONVERSIONS
Project Overview

- Background
  - Altavista, Hopewell and Southampton are 63 MW coal-fired power stations
  - Operating at low capacity factors (Altavista-cold reserve) due to high dispatch cost
  - Post-conversion, will be 51 MW each
- Waste wood supply is adequate & sustainable
- Estimated conversion cost of $150 million
- Significant Benefits
  - Strong customer value at a significantly lower cost than building an equivalent capacity of new greenfield biomass facilities
  - Environmental benefits
  - Economic growth engine
- Status
  - Application filed June 2011
  - VA SCC Hearing Jan. 10 - 12



Time-Differentiated Rate Pilot Programs for Customers in Virginia

- ❑ Electric Vehicle Pilot Program
- ❑ Smart Pricing Plan Pilot Program

Dominion Virginia Power's Electric Vehicle (EV) Pilot Program

- Pilot program offering time-of-use pricing options
- DVP will learn about EV penetration, customer charging patterns, and impacts on the grid
- Supports customers' adoption of EVs while attempting to minimize grid modifications by encouraging off-peak charging
  - EV-only rate: 54 cents/night for 40-mile commute
  - Whole-house rate: 51-61 cents/night for 40-mile commute
  - Compares to $1.10 cents/night using standard residential rate
  - Up to 750 participants in each rate option

http://www.dom.com/about/environment/electric-vehicles.jsp

Dominion Virginia Power's Smart Pricing Plan Pilot Program

- Voluntary time-differentiated rate tariff to encourage customers to use energy when demand is low.
- Prices change based on the day, as well as the time of day
  - Includes high, medium, and low priced days
  - During summer, highest daily prices between 1 p.m. and 7 p.m.
  - During winter, highest daily prices during early morning and late at night.
- Smart Pricing for Home – Open to 1,000 residential customers
- Smart Pricing for Business
  - Open to 1,000 business customers
  - Eligible customers are those currently served under rate schedules GS-1 and GS-2
- Requires metering on half hour intervals
  - Customers with existing interval data recorder (IDR) meters or AMI meters are eligible to participate.

http://www.dom.com/about/conservation/smart-pricing-plan-index.jsp

Dominion Renewable Power Generation Portfolio (as of Dec. 1, 2011)

Dominion Generation
Renewable Power Generation Portfolio

Renewable Utility Generation	Fuel	Region	Capacity in Operation in 2011 (MW)	Cumulative Capacity in Operation & Development in 2012+ (MW)
Pittsylvania	Biomass	PJM	83	83
Altavista, Hopewell and Southampton	Biomass	PJM	6	153
Virginia City Hybrid Energy Center*	Biomass	PJM	-	117
Undisclosed New Biomass	Biomass	PJM	-	100
Gaston (1-4)	Water	PJM	220	220
Roanoke Rapids	Water	PJM	95	95
Cushaw	Water	PJM	2	2
North Anna	Water	PJM	1	1
Virginia Wind Projects	Wind	PJM	0	248
Community Solar Power Program	Sun	PJM	0	30
Renewable Utility Generation			**407**	**1,049**

Renewable Merchant Generation	Fuel	Region	Capacity in Operation in 2011 (MW)	Cumulative Capacity in Operation & Development in 2012+ (MW)
NedPower (w/ Shell WindEnergy, Inc.) **	Wind	PJM	132	132
Fowler-Ridge (w/ BP Alternative Energy, Inc.) **	Wind	PJM	150	150
Prairie Fork	Wind	PJM	0	300
Renewable Merchant Generation			**282**	**582**
Total Renewable Generation			**689**	**1,631**

* Represents up to 20% of our proposed Virginia City Hybrid Energy Center 585 MW coal station

** Megawatt capacity values reflect Dominion's interest only

Some development projects are not included in Dominion's current Capex Plan